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IS 7714 (1975): Method of seability test for gasket material [MED 30: Gaskets and Packing]



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“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

METHOD OF SEALABILITY TEST FOR GASKET MATERIALS

1. Scope — Describes the method of evaluating liquid sealing properties of gasket materials.

2. Apparatus

2.1 The general arrangement of the apparatus used for sealability test is given in Fig. 1.

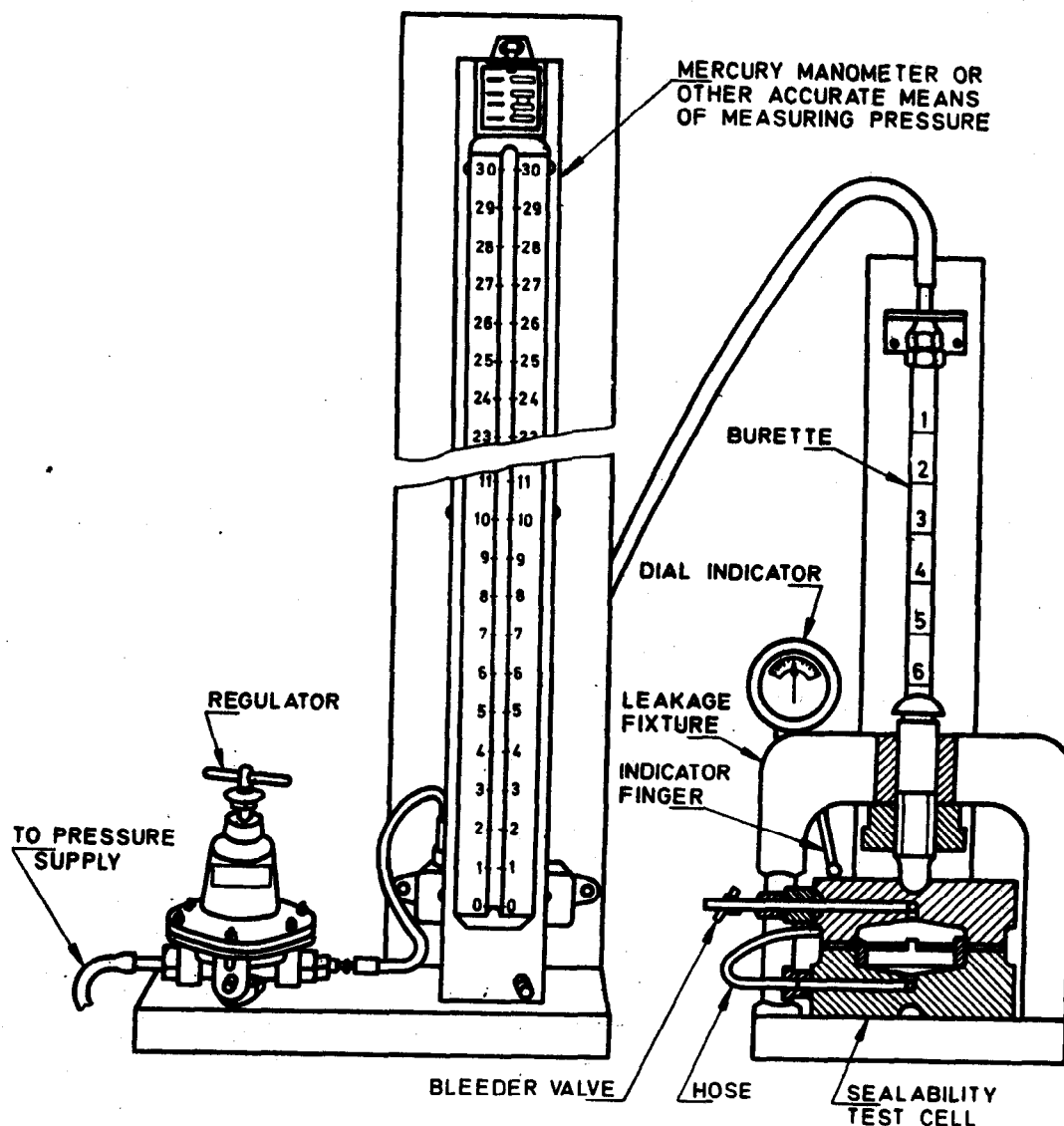


FIG. 1. APPARATUS FOR DETERMINING SEALABILITY OF GASKET MATERIALS

2.2 Compressed Air Supply and Regulator — A source of compressed air with a suitable regulator to control the pressure at a point between 0 and 760 mm of mercury.

2.3 Pressure Gauge — A 760 mm mercury manometer or suitable pressure gauge to read the pressure accurate to 0.5 mm of mercury column.

2.4 Burette — A 10-ml capacity burette graduated in 0.05 ml with a connection at each end for flexible hose.

2.5 Leakage Test Fixture — The fixture shall include a suitable dial indicator graduated in 0.025 mm and mounted as shown in Fig. 1.

2.6 Bleeder Valve — A bleeder valve shall be inserted in the upper flange to bleed air from the fixture.

2.7 Hose — A flexible hose of either rubber or plastic to withstand the pressures and media specified for the test being run shall be used for connections. Depending on the type of connection on the regulator and manometer, either hose fitting or hose clamp may be used to secure the hose.

2.8 Loading Device — A suitable means of applying an accurate external load to the leakage test fixture and of maintaining the load within one percent of its value shall be used as loading device. Loading shall be a minimum of 0.8 MPa* to a maximum of 28 MPa.

Note — A good device of applying the external load is a tensile machine. If a tensile machine is not available, any other means of applying a known load is satisfactory. This could be by dead weights, lever arm and weights or hydraulic ram.

3. Test Medium — Unless otherwise specified, the test medium shall be iso-octane.

4. Test Specimen

4.1 Gaskets cut from the material to be tested shall be cut so that the edges are flat, clean and free of burrs. The inside diameter of test specimen shall be 32.25 mm to 32.31 mm and the outside diameter 44.19 mm to 44.32 mm. The thickness of the test specimen shall be 0.8 mm unless otherwise agreed upon between the purchaser and the supplier.

4.2 If variations are observed prior to running any tests, at the completion of running a series of tests, or during a series of tests, the apparatus shall be checked up for leaks.

5. Conditioning

5.1 Before conducting any test, the specimens shall be conditioned in accordance with their material as given in 5.2 to 5.6.

5.2 Asbestos or Other Inorganic Fibre Gaskets [in accordance with IS : 2712-1971 Compressed asbestos fibre jointing (first revision)] — Specimens shall be conditioned in an oven at $100 \pm 2^\circ\text{C}$ for one hour and allowed to cool to $27 \pm 2^\circ\text{C}$ in a desiccator containing anhydrous calcium chloride. Specimens from asbestos paper and millboard gaskets shall be conditioned in an oven for four hours at $100 \pm 2^\circ\text{C}$ and allowed to cool to $27 \pm 2^\circ\text{C}$.

5.3 Cork; Cork and Rubber; and Cork and Cellular Rubber Gaskets [in accordance with IS : 4253 (Part I)-1967 Specification for cork composition sheets : Part I Plain cork; and IS : 4253 (Part II)-1968 Specification for cork composition sheets : Part II cork and rubber] — Specimens shall be conditioned at least for 46 hours in a controlled humidity room or in a closed chamber with gentle circulation of the air at $27 \pm 2^\circ\text{C}$ and 65 ± 5 percent relative humidity.

5.4 Cellulose or Other Organic Fibre Gaskets (in accordance with IS : 5566-1970 Specification for vegetable fibre base jointing material) — Specimens shall be pre-conditioned for 4 hours at $27 \pm 2^\circ\text{C}$ in a closed chamber, containing anhydrous calcium chloride as a desiccant. The air in the chamber shall be circulated by gentle mechanical circulation of air and conditioned for at least 20 hours at $27 \pm 2^\circ\text{C}$ and 65 ± 5 percent relative humidity.

5.5 If a mechanical means of maintaining 65 ± 5 percent relative humidity is not available, a tray containing a saturated solution of reagent grade magnesium nitrate [$\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$] shall be placed in the chamber to provide the required relative humidity. In all cases where testing is conducted outside the area of specified humidity, specimens shall be removed from the chamber one at a time as needed.

5.6 Unless otherwise specified, test shall be conducted at room temperature that is $27 \pm 2^\circ\text{C}$.

6. Methods of Test

6.1 The specimen shall be removed from the conditioning chamber and assembled in the leakage test fixture.

6.2 The assembly fixture shall be placed in the device for applying external load and the load specified by the user of the material being tested, shall be gradually applied in 20 seconds. This load shall be maintained for one minute.

Note — The fixture can be used from 0.8 MPa to 28 MPa.

6.3 The dial indicator shall be set to zero and the knurled nut in the test fixture tightened to maintain this zero reading within ± 0.02 mm as the external load is removed.

*1 MPa \approx 10 kgf/cm².

6.4 The loaded test cell and fixture shall be placed on the burette stand. With the bleeder valve on the test cell slightly open, the burette tube shall be filled with the specified test medium and the air from the system allowed to bleed.

6.5 After three minutes from the lock up (6.3) which includes the time required for the step outlined in 6.4, the internal pressure specified by the user of the material being tested shall be applied. The variation in pressure during the test shall be within ± 5 mm manometer reading. All connections shall be checked for leaks.

Note — Internal pressure on the medium shall be specified by the user of the material being tested. A pressure of 760 mm of mercury is recommended as a starting point.

6.6 After the pressure has been applied for five minutes to the test medium, the liquid level in burette shall be recorded to the nearest 0.05 ml. This shall be taken as the initial reading. The readings shall be continuously recorded at one minute intervals. When the difference between the readings is constant (within 10 percent) for three successive readings, the recording of reading shall be stopped. The average difference for three successive one minute readings shall then be calculated and multiplying this average difference by 60 the result shall be expressed as millilitres of leakage per hour.

6.7 Each test shall consist of a minimum of two specimens. The leakage as the average of two consecutive specimens having average leakage rates within 20 percent of each other shall be reported.

7. Test Report

7.1 The report shall include the following:

- a) Type of material tested,
- b) Average leakage in millilitres per hour,
- c) Average leakage of the two consecutive tests used in determining the average for the test specimen,
- d) Number of specimens tested and the maximum and minimum time in minutes required for obtaining three consecutive leakage rates within 10 percent, and
- e) External and internal pressures used, the medium used and the specimen thickness.

EXPLANATORY NOTE

The method described in this standard is designed to compare measureable leakage rates and sealing properties of various gasket materials under controlled conditions. It is intended as a measure of leakage through the gaskets or between the gaskets and the flange faces, or through both. Leakage may also be caused by flange warp, surface finish, stress relation, etc. Therefore, the results obtained by this test shall be correlated with actual working conditions. The method may be used as a routine test when agreed upon by the purchaser and the supplier. In the preparation of this standard assistance has been derived from ASTM F-37-1968 Standard method of test for sealability of gasket material, issued by the American Society for Testing and Materials.